

Verein für
Association pour le
Associazione per il



medizinische Qualitätskontrolle
contrôle de qualité médical
controllo di qualità medico

Report

Differential Blood Smear H3

MQ 2024-4

Acknowledgements

The Zybio Z3 analyzer was provided by the company Polymed, the ABX Microsemi CRP analyzer by the company Axonlab and the XP-300 analyzer by the Firma Sysmex. MQ employees conducted the measurements.

The findings of the XN-20 and ADVA 2120 devices and of the microscopic blood counts were generated by the Central Laboratory of Medical Diagnostic HAD of the University Hospital Zurich Hematology Clinic. The lab is ISO/IEC 17025 certified (STS 445). Prof. Dr. med. Stefan Balabanov is the responsible manager; Prof. MG Manz, M.D., the clinic director.
www.haematologie.usz.ch

For information regarding all analyses offered by the University Hospital of Zurich, see:
www.uzl.usz.ch

(c) 2024 Verein für medizinische Qualitätskontrolle

Index

1	SAMPLE A	4
1.1	ABX Microsemi CRP	4
1.2	Sysmex XP300	5
1.3	Zybio Z3 CRP	6
1.4	Sysmex XN-20	7
1.5	ADVIA 2120	9
1.6	Differential Blood Smear	11
1.7	Summary of participant results	13
1.8	Qualab Codes	14
2	SAMPLE B	15
2.1	ABX Microsemi CRP	15
2.2	Sysmex XP300	16
2.3	Zybio Z3 CRP	17
2.4	Sysmex XN-20	18
2.5	ADVIA 2120	20
2.6	Differential Blood Smear	22
2.7	Summary of participant results	24
2.8	Qualab Codes	25

1 Sample A

1.1 ABX Microsemi CRP



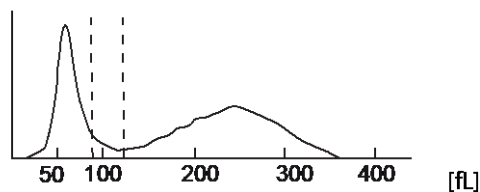
Findings MQ 2024-4 H3A

39 year old woman

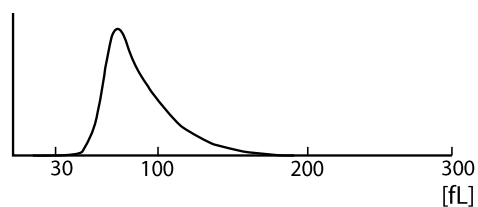
WBC :	9.1	$10^3/\mu\text{L}$	MCV :	90.2	μm^3
RBC :	5.06	$10^6/\mu\text{L}$	MCH :	30.0	pg
HGB :	15.1	g/dL	MCHC:	33.2	g/dL
HCT :	45.6	%	RDW :	12.9	%
PLT :	251	B $10^3/\mu\text{L}$	MPV :	7.3	B μm^3
PCT :	0.183	B %	PDW :	14.9	B %

DIFF:					
%LYM:	33.1	%	#LYM:	3.0	$10^3/\mu\text{L}$
%MON:	4.6	%	#MON:	0.4	$10^3/\mu\text{L}$
%GRA:	62.3	%	#GRA:	5.7	$10^3/\mu\text{L}$

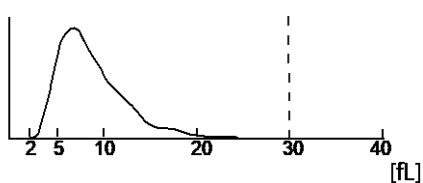
WBC



RBC



PLT



1.2 Sysmex XP300



Findings MQ 2024-4 H3A 39 year old woman

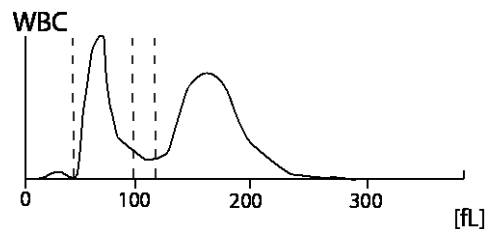
WBC	9.3	$10^3/\mu\text{L}$	WBC	
RBC	4.87	$10^6/\mu\text{L}$	RBC	
HGB	14.7	g/dL		
HCT	43.0	%		
MCV	88.3	fL		
MCH	30.2	pg		
MCHC	34.2	g/dL		
PLT	240	$10^3/\mu\text{L}$	PLT	
LYM%	34.9	%		
MXD%	3.4	%		
NEUT%	61.7	%		
LYM#	3.2	$10^3/\mu\text{L}$		
MXD#	0.3	$10^3/\mu\text{L}$		
NEUT#	5.8	$10^3/\mu\text{L}$		
RDW_SD	44.1	fL		
RDW_CV	12.8	%		
PDW	11.2	fL		
MPV	8.9	fL		
P_LCR	18.3	%		
PCT	0.21	%		

1.3 Zybio Z3 CRP

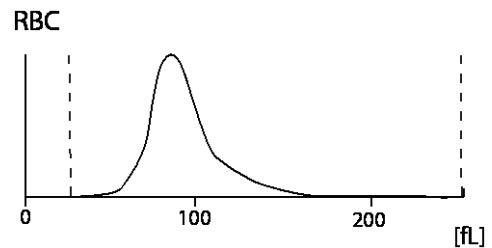


Findings MQ 2024-4 H3A 39 year old woman

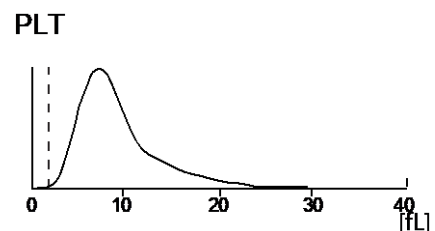
WBC	8.64	$10^3/\mu\text{l}$	3.50-9.50
Lym#	3.08	$10^3/\mu\text{l}$	1.10-3.20
Mid#	0.58	$10^3/\mu\text{l}$	0.10-3.20
Gran#	4.98	$10^3/\mu\text{l}$	1.80-6.30
Lym%	35.7	%	20.0-50.0
Mid%	6.7	%	3.0-15.0
Gran%	57.6	%	40.0-75.0



RBC	4.86	$10^6/\mu\text{l}$	3.80-5.80
HGB	15.2	g/dl	11.5-17.5
HCT	42.9	%	35.0-50.0
MCV	88.1	fL	82.0-100.0
MCH	31.2	pg	27.0-34.0
MCHC	35.4	g/dl	31.6-35.4



RDW-CV	13.5	%	11.5-16.0
RDW-SD	40.2	fL	35.0-56.0
PLT	221	$10^3/\mu\text{l}$	125-350
MPV	9.3	fL	6.5-12.0
PDW	15.9	fL	9.0-17.0
PCT	0.206	%	0.108-0.282
P-LCC	43	$10^3/\mu\text{l}$	30-90
P-LCR	19.4	%	11.0-45.0



1.4 Sysmex XN-20

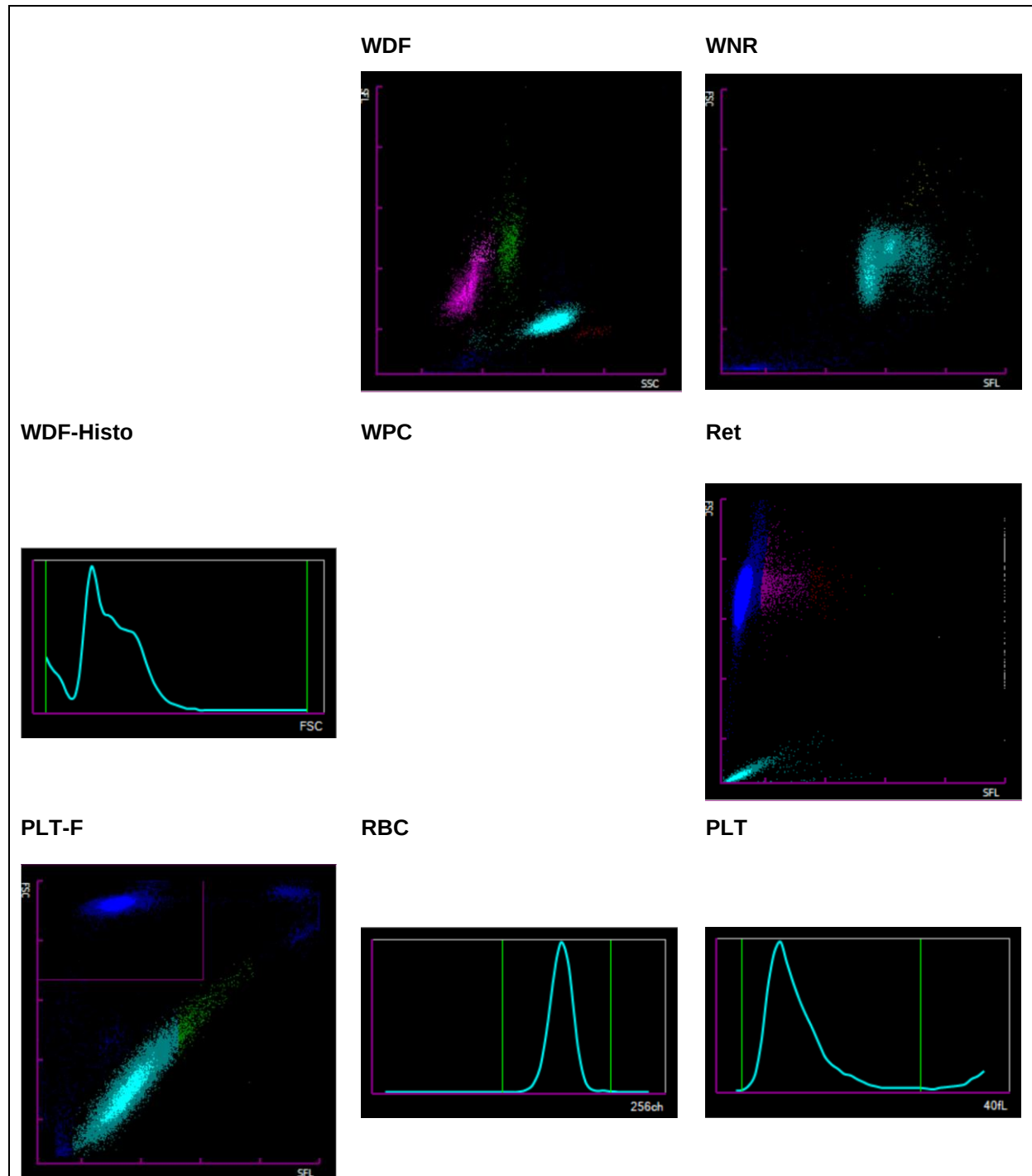


Findings MQ 2024-4 H3A

39 year old woman

Analysis	Result	Unit	Reference value
Blood Count			
<u>Hemoglobin</u>	150	g/l	117-153
<u>Hematocrit</u>	0.427	l/l	0.35-0.46
Erythrocytes	5.00	T/l	3.9-5.2
MCV	85.4	fl	80-100
MCH	30.0	pg	26-34
MCHC	351	g/l	310-360
Mikrocytes	12.5	%	11.0-14.8
<u>Thrombocytes</u>	255	G/l	143-400
<u>Leucocytes</u>	* 9.76	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	5.96	G/l	1.40 – 8.00
Monocytes	0.66	G/l	0.16 – 0.95
Eosinophils	0.06	G/l	0.00 – 0.70
Basophils	0.04	G/l	0.00-0.15
Lymphocytes	2.99	G/l	1.50 - 4.00
IG abs.	* 0.05	G/l	0.00 – 0.03
IG %	0.5	%	0.0 – 0.05
NRBC abs.	0.00	G/l	
NRBC	0.0	/100 Lc	

Findings HAD MQ 2024-4 H3A



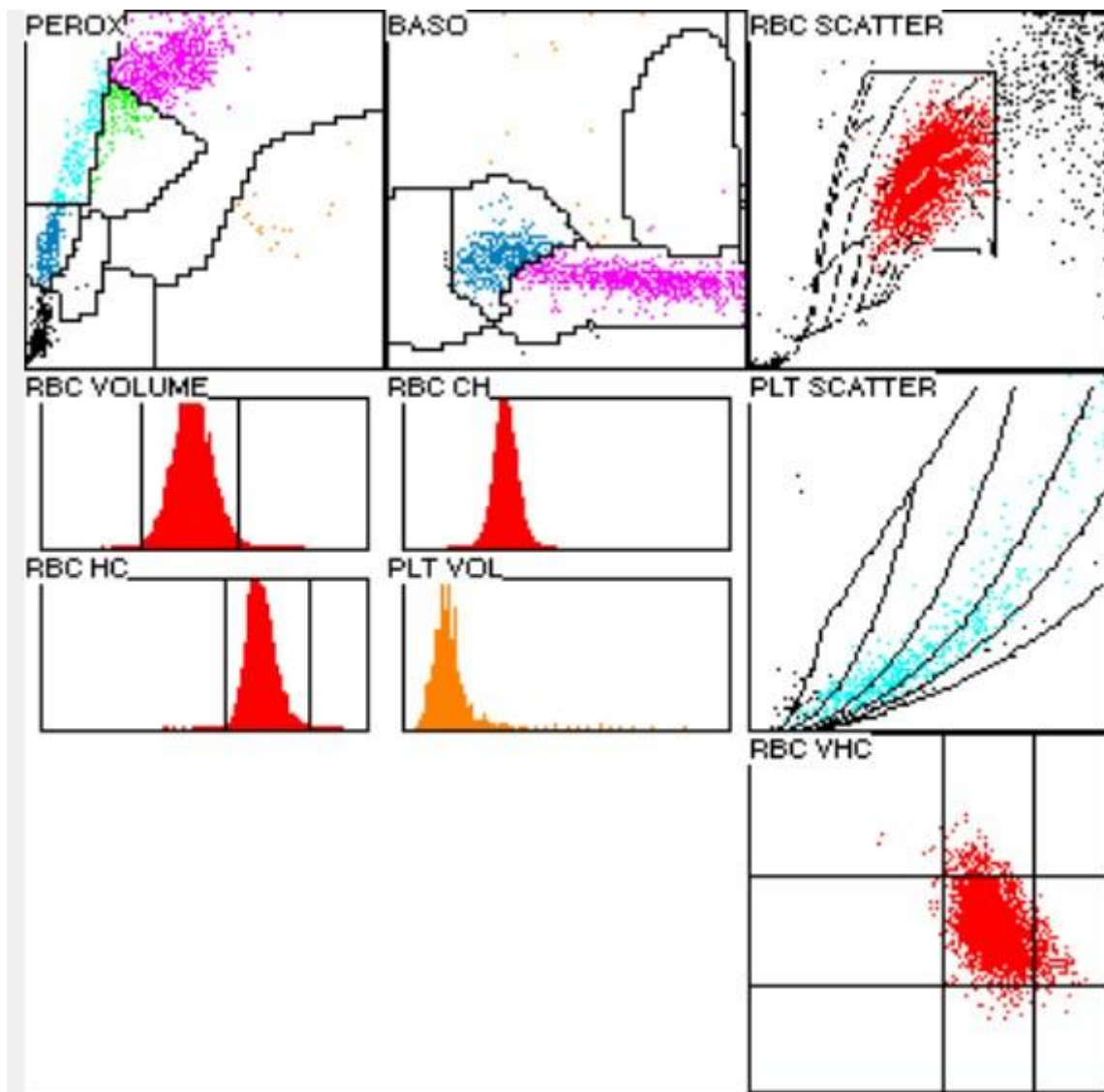
1.5 ADVIA 2120



Findings MQ 2024-4 H3B

39 year old woman

Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	152	g/l	117-153
Hematocrit	0.460	l/l	0.35-0.46
Erythrocytes	4.96	T/l	3.9-5.2
MCV	92.7	fl	80-100
MCH	30.6	pg	26-34
MCHC	330	g/l	310-360
Mikrocytes	0.3	%	0-2.0
Makrocytes	1.3	%	0-2.0
Hypochromic Ec	0.2	%	0-2.0
Hyerchromic Ec	0.5	%	0-2.0
RDW	13.3	%	11.0-0-14.8
Thrombocytes	226	G/l	143-400
Leukocytes	8.72	G/l	3.0-9.6
Leucocytes Differentiation			
Neutrophils	4.73	G/l	1.40-8.00
Monocytes	0.62	G/l	0.16-0.95
Eosinophils	0.05	G/l	0.00-0.70
Basophils	0.04	G/l	0.00-0.15
Lymphocytes	2.56	G/l	1.50-4.00
LUC	* 0.72	%	0.0-4.0



1.6 Differential Blood Smear

Findings HAD MQ 2024-4 H3A

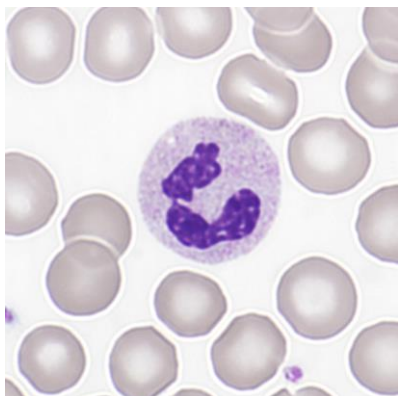
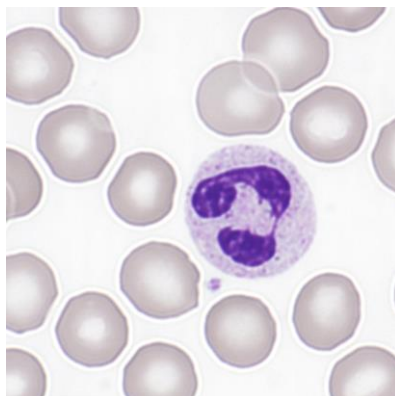
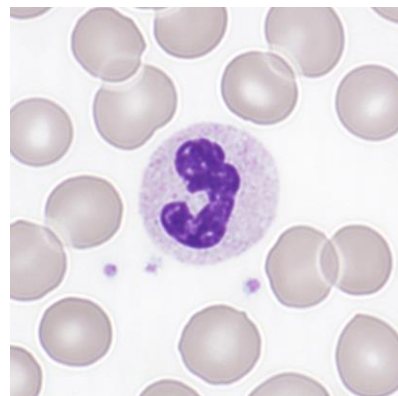
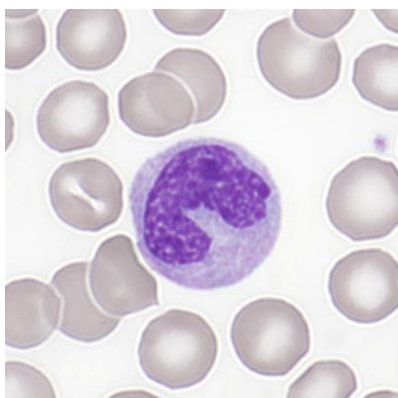
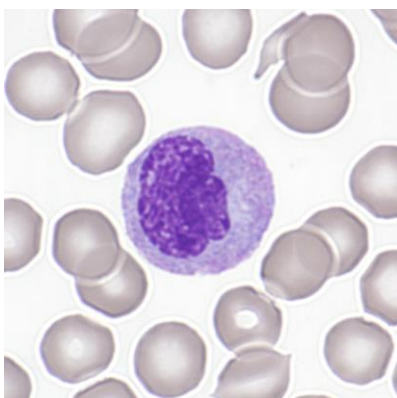
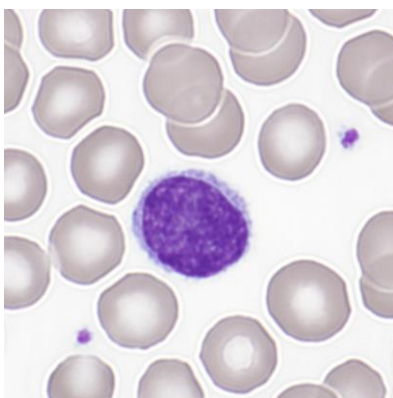
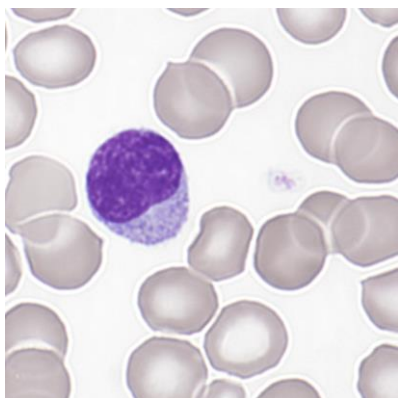
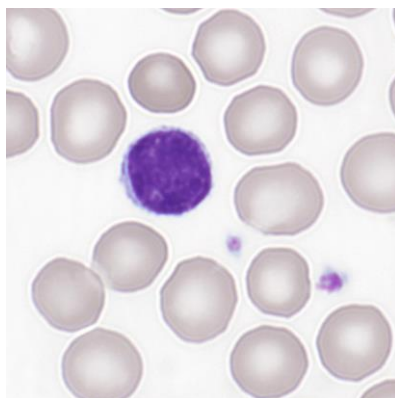
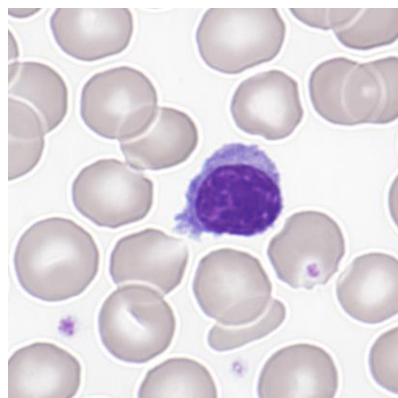
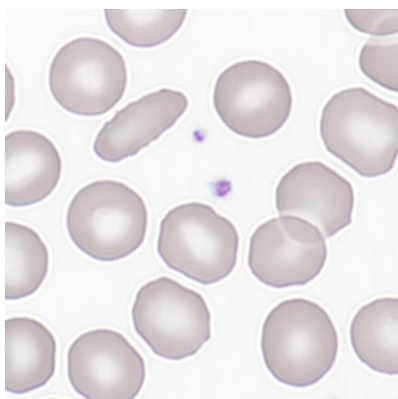
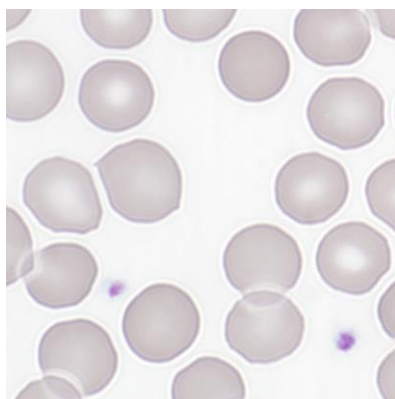
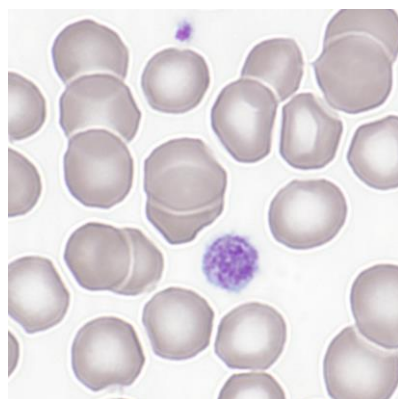
39 year old man

Analysis	Result	Unit	Reference value
Neutrophils total	5.71	G/l	1.40-8.00
Monocytes	0.35	G/l	0.16-0.95
Eosinophils	0.00	G/l	0.00-0.70
Basophils	0.13	G/l	0.00-0.15
Lymphocytes	2.53	G/l	1.50-4.00
Neutrophils total	65.5	%	40.0-74.0
Neutrophils Band	6.5	%	0.0-20.0
Neutrophils Segmented	* 59.0	%	30.0-50.0
Monocytes	4.0	%	3.4-9.0
Eosinophils	0.0	%	0.0-7.0
Basophils	1.5	%	0.0-1.5
Lymphocytes	29.0	%	19.0-48.0
Plasmacells	0.0	%	0-0.5
Blasts	0.0	%	0
Promyelocytes	0.0	%	0
Myelocytes	0.0	%	0
Metamyelocytes	0.0	%	0
Nucleated Red Cells	0.0	%	0

Commentary

Red blood count normochromic, normocytic. Neutrophil granulocytes with fine cytoplasmic granulation. Few lymphocytes atypical, probably slightly reactive. Thrombocytes morphologically unremarkable.

A. Sopran

*Abb 1. Neutrophile (Seg)**Abb 2. Neutrophile (Seg)**Abb 3. Neutrophile (Rod)**Abb 4. Monocyte**Abb 5. Monocyte**Abb 6. Monocyte**Abb 7. Lymphocyte**Abb 8. Lymphocyte**Abb 9. Lymphocyte**Abb 10. Platelets**Abb 11. Platelets**Abb 12. Giant Platelet*

1.7 Summary of participant results

Leukocyte Differenzial H3-A

	0	1-4	5-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	>79
Neutrophils Band	11	75	*56	31	7	1	2				
Neutrophils Segmented.	0		1		2	3	28	*106	42	1	
Eosinophils	*100	81	2								
Basophile	*136	46	1								
Monocytes	7	77	*94	4		1					
Lymphocytes			1	2	*54	120	5	1			
Plasmacells	*180	3									
Blasts	*183										
Promyelocytes	*182	1									
Myelocytes	*181	1	1								
Metamyelozyten	*179	3	1								
Erythrocytes Nucleated	*182	1									
Unknown	*180	3									
Smudge cells	*175	3	4	1							

Evaluation H3-A

	light	medium	strong			light	medium	strong
Hypersegmentation	5	4			Hypochromic Ec	11	1	
Pelger-Huet Anomaly	1				Polychromatic Ec	12		
Coarse Granulation	14	3			Anisocytes	63	6	
Basophilic Stripling	2	1			Mikrocytes	21	1	
Vacuoles	13				Makrocytes	10	2	
Reaktive Lymphocytes	*41	4	2		Megalocytes		1	
Atypical Lymphocytes	3		1		Poikilocytosis	22	4	1
Others	1				Ovalocytes	9	2	
					Target Cells	7		
					Akanthocytes	5		
Anisocytosis	70	10	1		Echinocytes	9		
Megakaryocyte Nucleaus	3				Sickle Cells	1		
Granulation	8				Fragmentocytes	2		
Others	1				Spherocytes	2		
					Stomatocytes	10	2	
					Basophilic Stripling			
					Howell-Jolly Bodies	3	1	
					Pappenheim Bodies			
					Others	2		

The blood comes from a healthy employee.

1.8 Qualab Codes

Summary of the participant codes
(Bold printed: expected codes)

Code	Text	Number
29	Normal findings	158
5	Atypical lymphocytes, probably reactive	31
30	Pathologic findings, refer to expert	17
9	Macrothrombocytes	16
16	Poikilocytosis	13
12	Microcytes	11
11	Thrombocytes, others	10
27	Erythrocytes, other	7
2	Neutrophils, left shift	6
14	Hypochromic Erythrocytes	6
15	Polychromatophilic Red Cells	6
31	Pathologic findings	6
1	Neutrophils, hypersegmentation of nucleus	5
4	Neutrophils, Toxic Changes	5
8	Leucocytes other:	5
18	Stomatocytes	5
24	Howell-Jolly bodies	5
10	Thrombocyte aggregates	4
13	Macrocytes	4
17	Elliptocytes/Ovalocytes	4
22	Rouleaux	4
6	Atypical lymphocytes, probably neoplastic	3
26	Teardrops	3
20	Fragmentocytes	2
3	Pelger Huet Anomaly	1
7	Auer rods	1
19	Targetcells	1
99	Total	159

2 Sample B

2.1 ABX Microsemi CRP



Findings MQ 2024-4 H3B

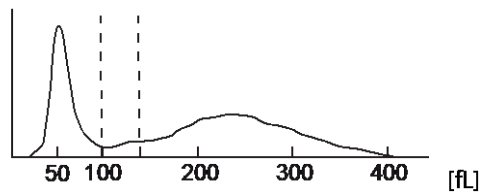
79 year old woman

WBC :	21.2	H	$10^3/\mu\text{L}$	MCV :	94.5	μm^3
RBC :	2.79	L	$10^6/\mu\text{L}$	MCH :	32.1	pg
HGB :	9.0	L	g/dL	MCHC:	34.0	g/dL
HCT :	26.4	L	%	RDW :	15.1	H %
PLT :	352		$10^3/\mu\text{L}$	MPV :	8.9	μm^3
PCT :	0.312		%	PDW :	16.7	%

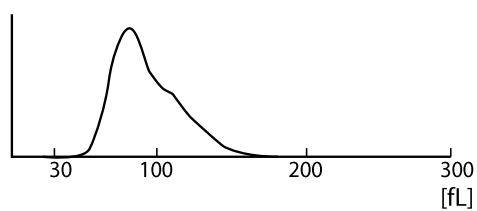
WBC Flags G1

DIFF:						
%LYM:	32.5	%	#LYM:	6.9	H	$10^3/\mu\text{L}$
%MON:	5.8	%	#MON:	1.2	H	$10^3/\mu\text{L}$
%GRA:	61.7	%	#GRA:	13.1	H	$10^3/\mu\text{L}$

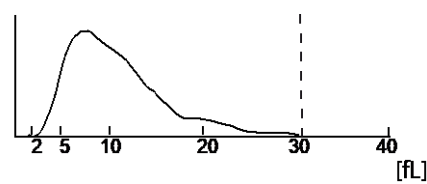
WBC



RBC



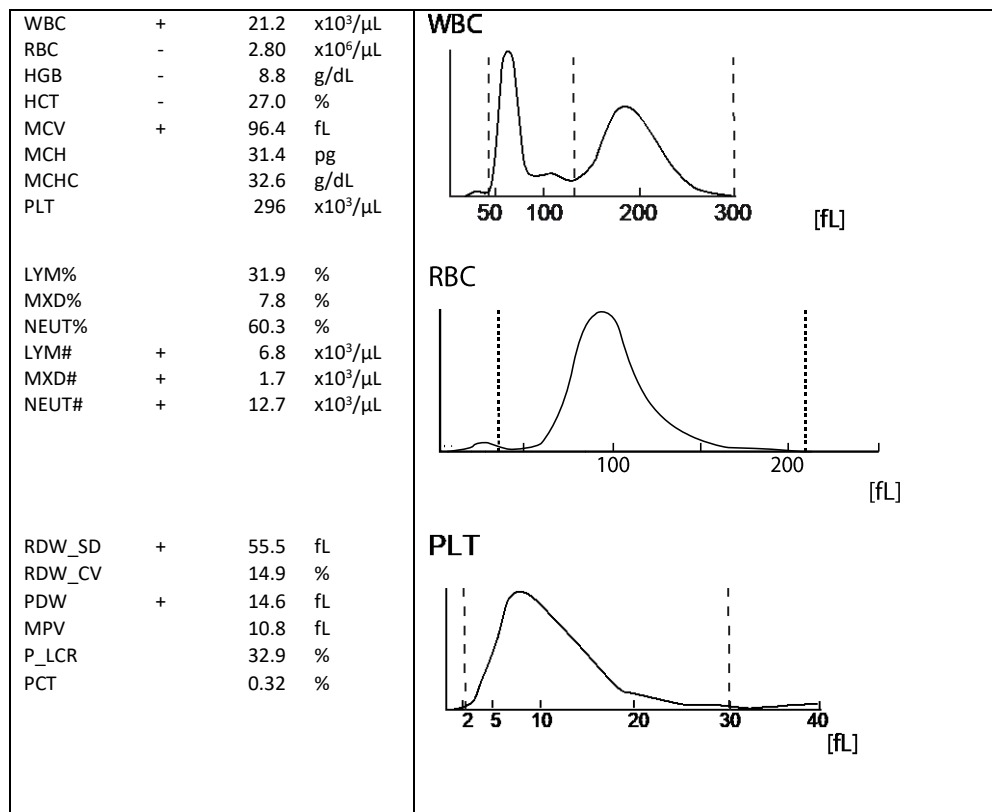
PLT



2.2 Sysmex XP300



Findings MQ 2024-4 H3B 79 year old woman



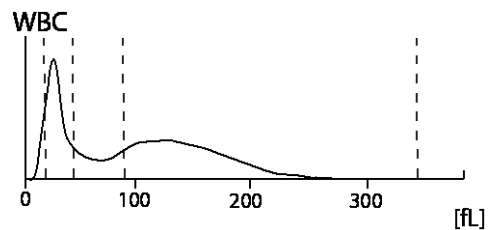
2.3 Zybio Z3 CRP



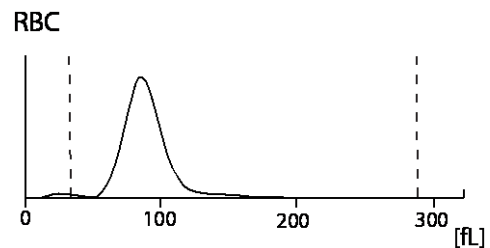
Findings MQ 2024-4 H3B

79 year old woman

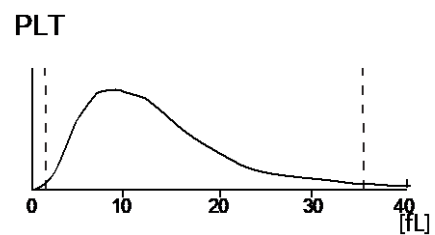
WBC	20.52	↑	$10^3/\mu\text{l}$	3.50-9.50
Lym#	6.67	↑	$10^3/\mu\text{l}$	1.10-3.20
Mid#	1.62	↑	$10^3/\mu\text{l}$	0.10-3.20
Gran#	12.23	↑	$10^3/\mu\text{l}$	1.80-6.30
Lym%	32.5		%	20.0-50.0
Mid%	7.9		%	3.0-15.0
Gran%	59.6		%	40.0-75.0



RBC	2.82	↓	$10^6/\mu\text{l}$	3.80-5.80
HGB	8.9	↓	g/dl	11.5-17.5
HCT	26.4	↓	%	35.0-50.0
MCV	93.4		fL	82.0-100.0
MCH	31.6		pg	27.0-34.0
MCHC	33.8		g/dl	31.6-35.4



RDW-CV	14.7		%	11.5-16.0
RDW-SD	47.2		fL	35.0-56.0
PLT	279		$10^3/\mu\text{l}$	125-350
MPV	11.5		fL	6.5-12.0
PDW	16.2		fL	9.0-17.0
PCT	0.322	↑	%	0.108-0.282
P-LCC	103	↑	$10^3/\mu\text{l}$	30-90
P-LCR	36.7		%	11.0-45.0



2.4 Sysmex XN-20

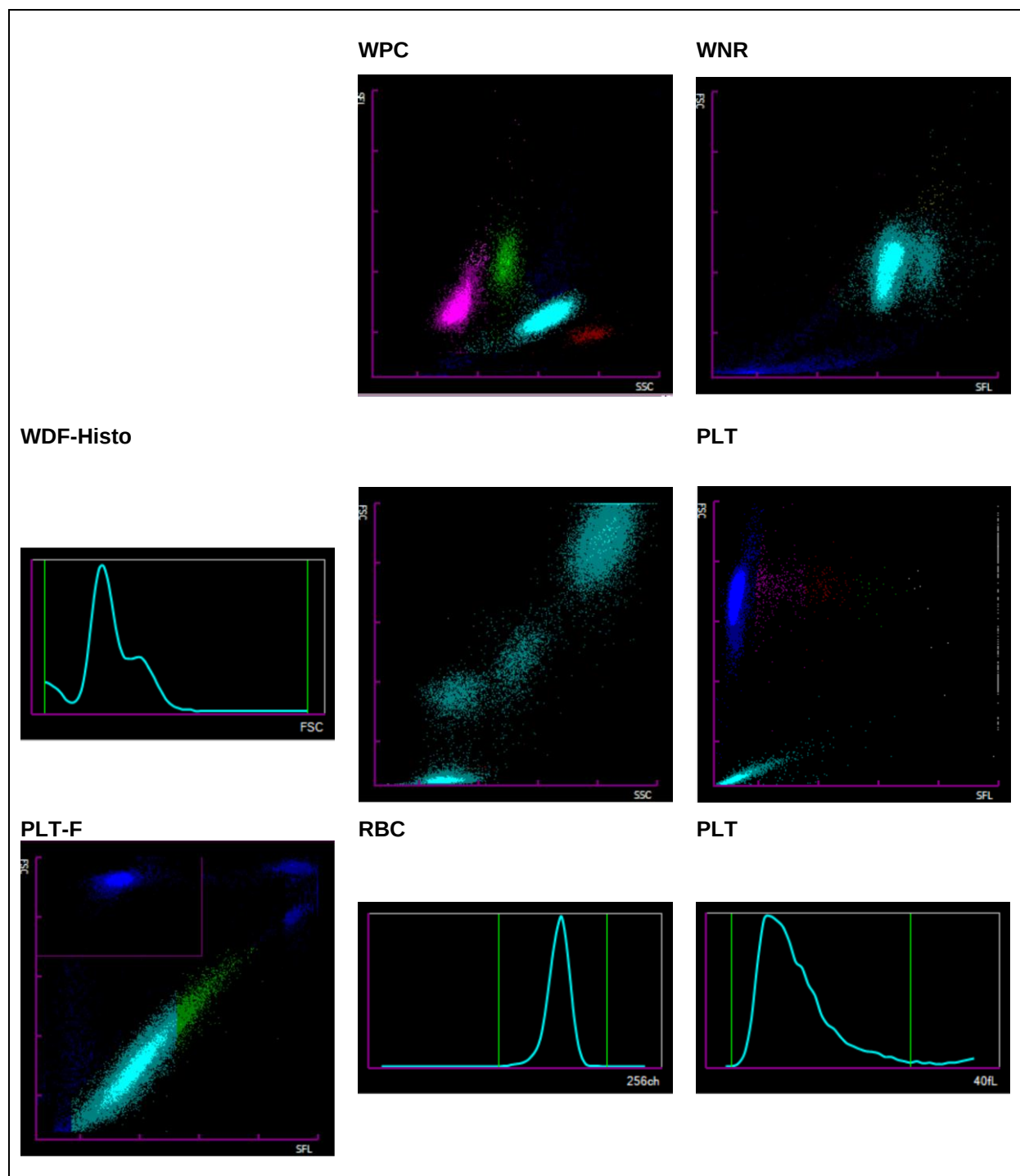


Findings MQ 2024-4 H3B

79 year old woman

Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	86	g/l	117-153
Hematocrit	0.262	l/l	0.35-0.46
Erythrocytes	2.76	T/l	3.9-5.2
MCV	94.9	fl	80-100
MCH	31.2	pg	26-34
MCHC	328	g/l	310-360
Thrombocytes	315	G/l	143-400
Leucocytes	* 23.27	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	* 13.23	G/l	1.40-8.00
Monocytes	* 1.70	G/l	0.16-0.95
Eosinophils	0.43	G/l	0.00-0.70
Basophils	0.04	G/l	0.00-0.15
Lymphocytes	* 7.57	G/l	1.50-4.00
IG abs.	* 0.30	G/l	0.00-0.03
IG %	* 1.3	%	0.0-0.5
NRBC abs.	0.02	G/l	
NRBC	0.1	/100 Lc	

Findings HAD MQ 2024-4 H3B



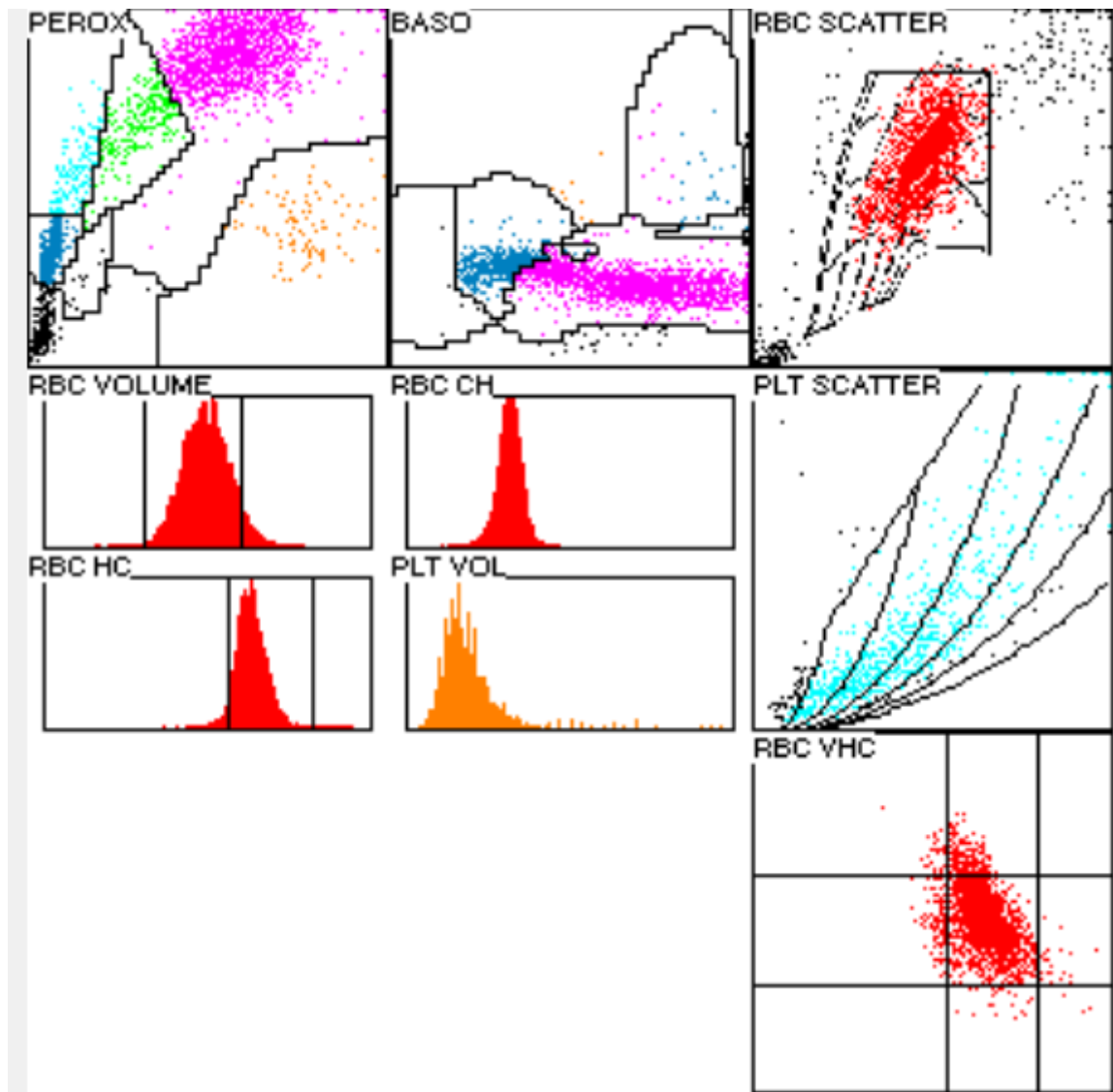
2.5 ADVIA 2120



Findings MQ 2024-4 H3B

79 year old man

Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	87	g/l	117-153
Hematocrit	0.277	l/l	0.35-0.46
Erythrocytes	2.79	T/l	3.9-5.2
MCV	99.2	fl	80-100
MCH	31.3	pg	26-34
MCHC	316	g/l	310-360
Mikrocytes	0.3	%	0-2.0
Makrocytes	* 5.8	%	0-2.0
Hypochromic Ec	* 4.2	%	0-2.0
Hyerchromic Ec	0.1	%	0-2.0
RDW	14.6	%	11.0-0-14.8
Thrombocytes	287	G/l	143-400
Leukocytes	* 22.13	G/l	3.0-9.6
Leucocytes Differentiation			
Neutrophils	61.6	G/l	1.40-8.00
Monocytes	4.6	G/l	0.16-0.95
Eosinophils	1.7	G/l	0.00-0.70
Basophils	0.2	G/l	0.00-0.15
Lymphocytes	29.0	G/l	1.50-4.00
LUC	2.9	%	0.0-4.0



2.6 Differential Blood Smear

Findings HAD MQ 2024-4 H3B

79 year old woman

Analysis		Result	Unit	Reference value
Leucocytes Differentiation				
Neutrophils total	*	13.72	G/l	1.40-8.00
Monocytes	*	1.66	G/l	0.16-0.95
Eosinophils		0.33	G/l	0.00-0.70
Basophils		0.00	G/l	0.00-0.15
Lymphocytes	*	4.43	G/l	1.50-4.00
Erythroblasts		0.0	/100 Lc	
Neutrophils total		62.0	%	40.0-74.0
Neutrophils Band		6.0	%	0.0-20.0
Neutrophils Segmented	*	56.0	%	30.0-50.0
Monocytes		7.5	%	3.4-9.0
Eosinophils		1.5	%	0.0-7.0
Basophils		0.0	%	0.0-1.5
Lymphocytes		20.0	%	19.0-48.0
Plasmacells		0.0	%	0-0.5
Blasts		0.0	%	0
Promyelocytes		0.0	%	0
Myelocytes		0.0	%	0
Metamyelocytes		0.0	%	0
Others/ damaged cells		9.0	%	0

Commentary

Red blood count normochromic, slightly anisocytic with few macrocytes. Slight poikilocytosis with many echinocytes. Neutrophil granulocytes with slightly coarsened cytoplasmic granulation, many with pyknotic nuclei. Lymphocytes atypical, probably neoplastic. Small lymphocytes with round nucleus, dense, condensed chromatin structure and very narrow cytoplasmic rim. 9% nuclear shadow (counted in Divers) detectable. Slight anisocytosis of the thrombocytes.

A. Sopran

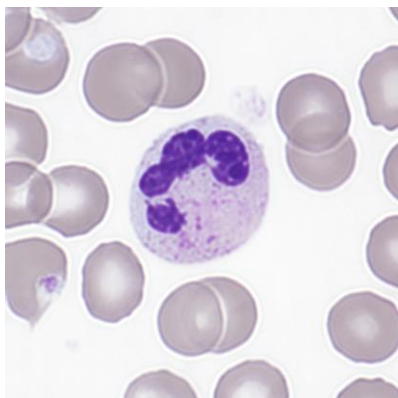


Abb 1. Neutrophil (Seg)

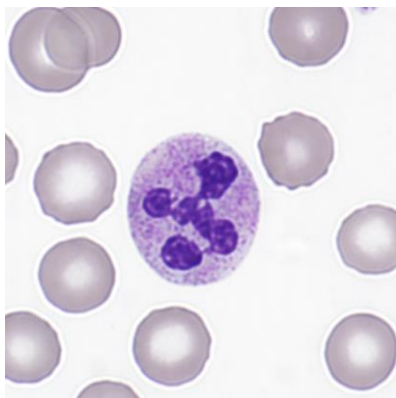


Abb 2. Neutrophil (Seg)

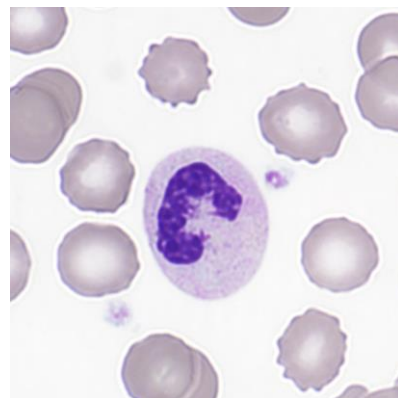


Abb 3. Neutrophil (Rod)

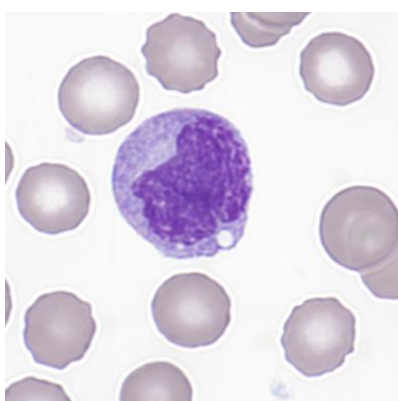


Abb 4. Monocyte

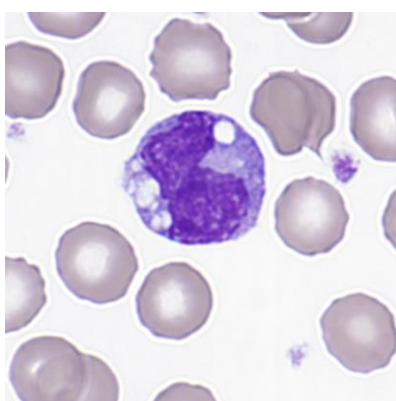


Abb 5. Monocyte

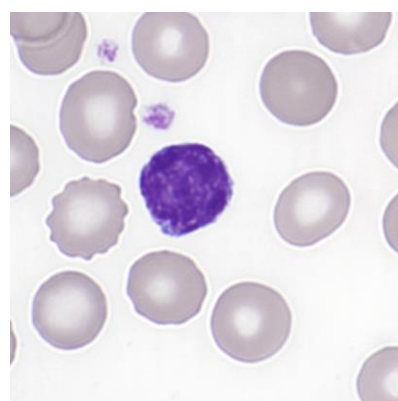


Abb 6. Lymphocyte

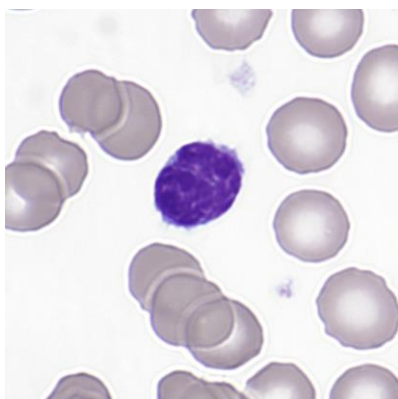


Abb 7. Lymphocyte

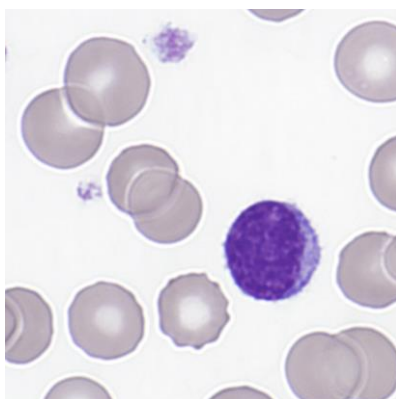


Abb 8. Lymphocyte

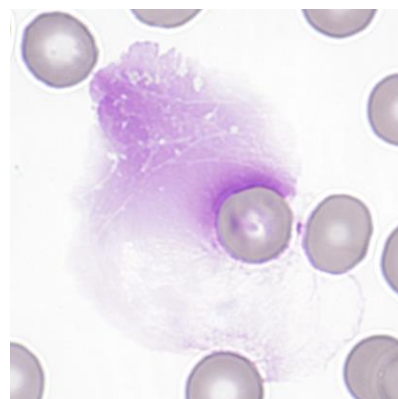


Abb 9. Smudge Cell

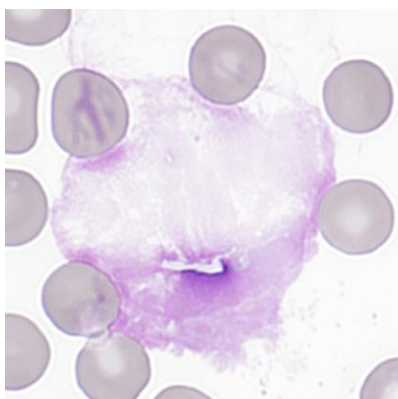


Abb 10. Smudge Cell

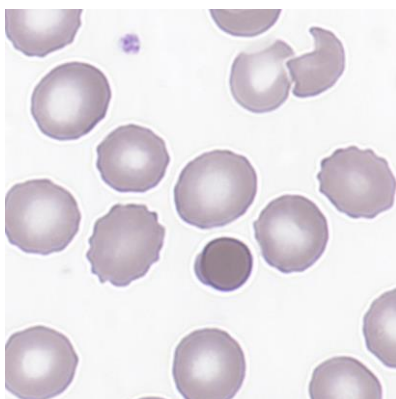


Abb 11. Erythrocytes

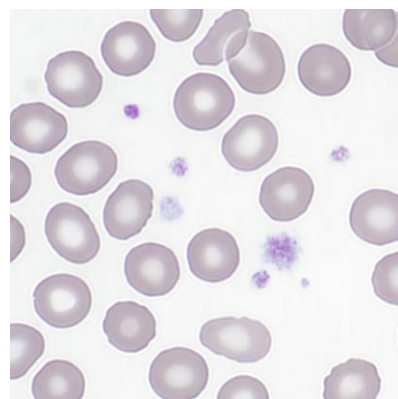


Abb 12. Platelets

2.7 Summary of participant results

Leukocyte Differential H3-B

	<1	1-4	5-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	>79
Neutrophils Band	5	53	*77	32	12	3	1	1			
Neutrophils Segmented.				1	6	15	67	*82	13		
Eosinophils	21	*155	5	1	2						
Basophile	*161	22	1								
Monocytes	13	113	*53	4	1						
Lymphocytes	1	1	1	11	*88	73	8		1		
Plasmacells	*183	1									
Blasts	*180	2	2								
Promyelocytes	*183	1									
Myelocytes	*167	17									
Metamyelozyten	*172	12									
Erythrocytes Nucleated	*179	4	1								
Unknown	*178	3	2	1							
Smudge cells	87	8	*16	46	24	3					

Evaluation H3-B

	light	medium	strong		light	medium	strong
Hypersegmentation	36	8	3	Hypochromic Ec	37	23	4
Pelger-Hüet Anomaly	3			Polychromatic Ec	56	1	
Coarse Granulation	*88	39	4	Anisocytes	*98	32	
Basophilic Stripping	12	2		Mikrocytes	42	12	1
Vacuoles	34	7		Makrocytes	*44	2	1
Atypical Lymph, reactive	16	1	1	Megalocytes	2	1	
Atypical Lymph, neoplastic	24	*29	10	Poikilocytosis	*64	18	
Others	3	3	1	Ovalocytes	21		
				Target Cells	20	10	
				Akanthocytes	34	8	2
Anisocytosis	*87	24	2	Echinocytes	*49	28	5
Megakaryocyte Nucleaus	4			Sickle Cells	2		1
Granulation	24	6	1	Fragmentocytes	31		
Others	3			Spherocytes	17		
				Stomatocytes	4		
				Basophilic Stripping	11	1	
				Howell-Jolly Bodies	9		
				Pappenheim Bodies			
				Others	1	1	1

The blood comes from a patient with known CLL. Please always indicate the damaged cells separately in the EQA schemes, even if they were obviously lymphocytes, as in this case. See also Focus 2010-1 'CLL' and 2016-3 'Smudge cells'.

2.8 Qualab Codes

Summary of the participant codes
(Bold printed: expected codes)

Code	Text	Number
31	Pathologic findings	109
6	Atypical lymphocytes, probably neoplastic	73
4	Neutrophils, Toxic Changes	62
30	Pathologic findings, refer to expert	58
14	Hypochromic Erythrocytes	35
16	Poikilocytosis	34
12	Microcytes	21
1	Neutrophils, hypersegmentation of nucleus	20
13	Macrocytes	20
8	Leucocytes other:	19
19	Targetcells	19
20	Fragmentocytes	18
27	Erythrocytes, other	18
15	Polychromatophilic Red Cells	17
9	Macrothrombocytes	14
2	Neutrophils, left shift	10
11	Thrombocytes, others	10
5	Atypical lymphocytes, probably reactive	9
21	Spherocytes	5
22	Rouleaux	4
26	Teardrops	4
29	Normal findings	4
17	Elliptocytes/Ovalocytes	3
24	Howell-Jolly bodies	3
25	Basophilic strippling	2
3	Pelger Huet Anomaly	1
10	Thrombocyte aggregates	1
99	Total	159